

# Minnesota Academic Standards: Interface with Big River Journey

NOTE: All grade levels within the Minnesota State Standards include a strand titled "The Nature of Science and Engineering." This strand is not intended to be taught separately, but as a process for teaching the other standards. Activities below can be modified to include the appropriate grade level standards for the strand.

Big River Teacher's Guide Classroom Activities	Grade Level	Strand	Sub-Strand	Standard Understand that...	Benchmarks (ex.)
<b>Water Cycle: Imagine!</b>	4	<b>Science</b> 3. Earth Science	2. Interdependence Within the Earth System	3. Water circulates through the earth's crust, oceans and atmosphere in what is known as the water cycle.	1. Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation, precipitation.
<b>Water Cycle: The Incredible Journey</b>	4	<b>Science</b> 3. Earth Science	2. Interdependence Within the Earth System	3. Water circulates through the earth's crust, oceans and atmosphere in what is known as the water cycle.	1. Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation, precipitation.
	6	2. Physical Science	1. Matter	2. Substances can undergo physical changes which do not change the composition or the total mass of the substance in a closed system.	3. Use the relationship between heat and the motion and arrangement of particles in solids, liquids, and gases to explain melting, freezing, condensation, and evaporation.
	5	<b>Language Arts</b> 2. Writing	B. Elements of Composition	The student will engage in a writing process, with attention to organization, focus, and quality of ideas, audience and a purpose.	1. Write topic sentences. 2. Create multiple paragraph compositions. 3. Use composing processes.
<b>Geology: Create Sedimentary Strata</b>	3	<b>Science</b> 1. The Nature of Science	1. Practice of Science	2. Scientific inquiry is a set of interrelated processes... to pose questions about the natural world...	4. Construct reasonable explanations based on evidence collected from observations or experiments.
	4	3. Earth Science	1. Earth Structure and Processes	3. Rocks are Earth materials that may vary in composition.	1. Recognize that rocks may be uniform or made of mixtures of different minerals.
	5	3. Earth Science	1. Earth Structure and Processes	2. The surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	1. Explain how, over time, rocks weather and combine with organic matter to form soil. 2. Explain how slow processes, such as water erosion, and rapid processes,, such as landslides, and volcanic eruptions, form features of the Earth's surface.
<b>Geology: Make Your Own Fossil</b>	7	<b>Science</b> 4. Life Science	3. Evolution in Living Systems	2. Individual organisms with certain traits in particular environments are more likely than others to survive and have offspring.	1. Explain how the fossil record documents the appearance, diversification and extinction of many life forms.

<b>Geology: Make Your Own Fossil (cont'd)</b>	8	3. Earth Science	1. Earth Structure and Process	3. Rocks and rock formations indicate evidence of the materials and conditions that produced them.	<p>2. Use internal and external anatomical structures to compare and infer relationships between living organisms as well as those in the fossil record.</p> <p>1. Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.</p>
<b>Aquatic Bugs &amp; Their Feeding Habits</b>	3	<b>Science</b> 4. Life Science	1. Structure and Function in Living Systems.	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	<p>1. Compare how the different structures of plants and animals serve various functions of growth, survival, and reproduction.</p> <p>2. Identify common groups of plants and animals using observable physical characteristics, structures and behaviors.</p>
	5	4. Life Science	1. Structure and Function in Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.
<b>Macroinvertebrate Mayhem</b>	5	<b>Science</b> 4. Life Science	1. Structure and Function in Living Systems.	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.
	5	4 Life Science	2. Interdependence Among Living Systems.	1. Natural systems have many components that interact to maintain the living system.	<p>1. Describe a natural system in Minnesota, such as a wetland, prairie or garden, in terms of the relationships among its living and nonliving parts, as well as inputs and outputs.</p> <p>2. Explain what would happen to a system such as a wetland, prairie, or garden if one of its parts were changed.</p>
	5	4. Life Science	4. Human Interactions with Living Systems	1. Students will understand that humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	1. Give examples of beneficial and harmful human interaction with natural systems.
<b>Birds, Beaks, and Adaptations</b>	3	<b>Science</b> 4. Life Science	1. Structure and Function in Living Systems.	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	<p>1. Compare how the different structures of plants and animals serve various functions of growth, survival, and reproduction.</p> <p>2. Identify common groups of plants and animals using observable physical characteristics, structures and behaviors.</p>
	3	4. Life Science	3. Evolution in Living Systems	2. Offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.	<p>1. Give examples of likenesses between adults and offspring in plants and animals that can be inherited or acquired.</p> <p>2. Give examples of differences among individuals that can give an individual an advantage in survival and reproduction.</p>

<b>Birds, Beaks, and Adaptations (cont'd)</b>	5	4. Life Science	1. Structure and Function in Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.
<b>River Ecosystem: Web of Life Game</b>	3	<b>Science</b> 4. Life Science	1. Structure and Function in Living Systems.	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	1. Compare how the different structures of plants and animals serve various functions of growth, survival, and reproduction. 2. Identify common groups of plants and animals using observable physical characteristics, structures and behaviors.
	3	4. Life Science	3. Evolution in Living Systems	2. Offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.	2. Give examples of differences among individuals that can sometimes give an individual an advantage in survival and reproduction.
	5	4. Life Science	1. Structure and Function in Living Systems.	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.
	5	4 Life Science	2. Interdependence Among Living Systems.	1. Natural systems have many components that interact to maintain the living system.	1. Describe a natural system in Minnesota, such as a wetland, prairie or garden, in terms of the relationships among its living and nonliving parts, as well as inputs and outputs. 2. Explain what would happen to a system such as a wetland, prairie, or garden if one of its parts were changed. (Example: investigate how an invasive species changes an ecosystem.)
	5	4. Life Science	4. Human Interactions with Living Systems	1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	1. Give examples of beneficial and harmful human interaction with natural systems.
<b>Build an Aluminum Foil Boat</b>	3	<b>Science</b> 1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	4. Construct reasonable explanations based on evidence collected from observations or experiments.
	4	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.	1. Identify and investigate a design solution and describe how it was used to solve an everyday problem. 2. Generate ideas and possible constraints for solving a problem through engineering design. 3. Test and evaluate solutions, considering advantages and disadvantages for the engineering solution, and communicate the results effectively.

<b>Build an Aluminum Foil Boat (cont'd)</b>	6	1. The Nature of Science and Engineering.	2. The Practice of Engineering	1. Engineers create, develop and manufacture machines, structures, processes and systems that impact society and may make humans more productive.	1. Identify a common engineered system and evaluate its impact on the daily life of humans. 2. Recognize that there is no perfect design and that new technologies have consequences that may increase some risks and decrease others. 4. Explain the importance of learning from past failures, in order to inform future designs of similar products or systems.
<b>The Island Watershed Activity</b>	4	<b>Social Studies</b> 3. Geography	1. Geospatial Skills	1. People use geographic representations and geospatial techniques to acquire, process and report information within a spatial contest.	1. Create and use various kinds of maps...; incorporate the “TODALS” map basics, as well as points, lines and colored areas to display spatial information.
	4	<b>Science</b> 3. Earth Science	2. Interdependence Within the Earth System  3. Human Interactions with Earth Systems	1. Water circulates through the Earth’s crust, oceans, and atmosphere in what is known as the water cycle.  1. In order to maintain and improve their existence, humans interact with and influence Earth systems.	1. Identify where water collects on Earth, including atmosphere, ground and surface water, and describe how water moves through the Earth system ...  1. Describe how the methods people utilize to obtain water in their homes and communities can affect water supply and quality.
	5	1. The Nature of Science and Engineering  3. Earth Science	1. The Practice of Science  1. Earth Structure and Processes	1. Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.  2. The surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	4. Understand that different models can be used to represent natural phenomena and these models have limitations about what they can explain.  2. Explain how slow processes, such as water erosion, and rapid processes, such as landslides and volcanic eruptions, form features of the Earth’s surface.
<b>Watershed in a Box</b>	3	<b>Science</b> 1. Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world.	4. Construct reasonable explanations based on evidence from observations or experiments.
	4	3. Earth Science	2. Interdependence Within the Earth System  4. Human Interactions with Earth Systems	3. Water circulates through the earth’s crust, oceans and atmosphere in what is known as the water cycle.  1. In order to maintain and improve their existence, humans interact with and influence Earth systems.	1. Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system...  1. Describe how the methods people utilize to obtain water in their homes and communities can affect water supply and quality.
	5	4. Life Science	4. Human Interactions with Living Systems	1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	1. Give examples of beneficial and harmful human interaction with natural systems. (Example: pollution.)

<b>Non-point Source Pollution</b>	4	<b>Science</b> 1. The Nature of Science and Engineering	2. Practice of Engineering	1. Engineers design, create and develop structures, processes and systems that are intended to improve society and may make humans more productive.	1. Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.
	5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to improve their existence, humans interact with and influence Earth Systems.	3. Compare the impact of individual decisions on natural systems.
	5	4. Life Science	2. Interdependence Among Living Systems  4. Human Interactions with Living Systems	1. Natural systems have many components that interact to maintain the living system.  1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	2. Explain what would happen to a system such as a wetland, prairie, or garden if one of its parts were changed. (Example: Investigate how runoff affects plants and other parts of an ecosystem.)  1. Give examples of beneficial and harmful human interaction with natural systems. (Example: pollution)
<b>The Enviroscope</b>	4	<b>Science</b> 3. Earth Science	4. Human Interactions with Earth Systems	1. In order to improve their existence, humans interact with and influence Earth Systems.	1. Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.
	5	1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.	4. Understand that different models can be used to represent natural phenomena and these models have limitations about what they can explain.
	5	4. Life Science	2. Interdependence Among Living Systems  4. Human Interactions with Living Systems	1. Natural systems have many components that interact to maintain the living system.  1. Students will understand that humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	2. Explain what would happen to a system such as a wetland, prairie, or garden if one of its parts were changed.  1. Give examples of beneficial and harmful human interaction with natural systems.

<b>Map the Mississippi Watershed</b>	3	<b>Social Studies</b> 3. Geography	1. Geospatial Skills	1. People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.	2. Create and interpret simple maps of places around the world, local to global; incorporate the “TODALS” map basics, as well as points, lines, and colored areas to display spatial information.
	4-5	3. Geography	3. Human Systems	8. Processes of cooperation and conflict among people influence the division and control of the earth’s surface.	1. Identify physical and human features that act as boundaries or dividers; give examples of reasons why people have made or used boundaries. (Examples: Physical features – mountains, rivers)
	4	<b>Science</b> 3. Earth Science	1. Geospatial Skills  2. Places and Regions	1. People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.  3. Places have physical characteristics (such as climate, topography) and human characteristics (such as population).  4. People construct regions to identify, organize and interpret areas of the Earth’s surface, which simplifies the earth’s complexity.	1. Create and use various kinds of maps, including overlaying thematic maps, of places in the United States...; incorporate the “TODALS” map basics, as well as points, lines, and colored areas to display spatial information. 1. Locate and identify the physical and human characteristics of places in the United States (Examples: Physical characteristics – landforms (mountains), bodies of water (Mississippi River)...; Human characteristics – political boundaries...) 1. Name and locate states and territories, major cities and state capitals in the United States.
<b>Map the River in the Twin Cities</b>	3	<b>Social Studies</b> 3. Geography	2. Interdependence within the Earth system	3. Water circulates through the Earth’s crust, oceans and atmosphere in what is known as the water cycle.	1. Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system...
	4-5	3. Geography	1. Geospatial Skills	1. People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.	2. Create and interpret simple maps of places around the world, local to global; incorporate the “TODALS” map basics, as well as points, lines, and colored areas to display spatial information.
	6	3. Geography	3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.	1. Create and use various kinds of maps, including overlaying thematic maps, of places in the United States...; incorporate the “TODALS” map basics, as well as points, lines, and colored areas to display spatial information. 1. Explain how geographic factors affect population distribution and the growth of cities in the United States.
	5	<b>Science</b> 1. The Nature of Science and Engineering	3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.	1. Locate, identify and describe major physical features in Minnesota; explain how physical features and the location of resources affect settlement patterns and growth of cities in MN.
			3. Interactions Among Science, Engineering, Technology & Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things they could not otherwise accomplish.	2. Create and analyze different kinds of maps of the student’s community and of Minnesota.



<b>Lessons from a Landscape</b>	3	<b>Science</b> 1. The Nature of Science	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world...	4. Construct reasonable explanations based on evidence collected from observations or experiments.
	4	1. The Nature of Science	2. The Practice of Engineering	1. Engineers design, create, and develop structures, processes and systems that are intended to improve society...	1. Describe the positive and negative impacts that the designed world has on the natural world...
		3. Earth Science	2. Interdependence within the Earth System	3. Water circulates through the Earth's crust, oceans and atmosphere in what is known as the water cycle.	1. Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system ...
		3. Life Science	4. Human Interactions with Earth Systems	1. In order to improve their existence, humans interact with and influence Earth Systems.	1. Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.
	5	3. Earth Science	1. Earth Structure and Process	2. The surface of the Earth changes. Some changes are due to slow processes and some are due to rapid processes.	2. Explain how slow processes, such as water erosion, and rapid process, such as landslides... form features of the Earth's surface.
		4. Life Science	4. Human Interactions with Living Systems	1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	1. Give examples of beneficial and harmful human interaction with natural systems.
	3	<b>Social Studies</b> 3. Geography	1. Geospatial skills	1. People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.  2. Geographic inquiry is a process in which people ask geographic questions and gather, organize and analyze information to solve problems and plan for the future.	2. Create and interpret simple maps of places around the world, local to global; incorporate the "TODALS" map basics, as well as points, lines, and colored areas to display spatial information.  1. Choose the most appropriate data from maps and charts in an atlas to answer specific questions about geographic issues. (Example: How has human activity had an impact on the environment?)
<b>Prepare for a Visit to Historic Fort Snelling</b>	5	<b>Social Studies</b> 4. History	4. United States History	16. Rivalries among European nations and their search for new opportunities fueled expanding global trade networks... and settlement and exploitation of indigenous peoples and lands...	2. Describe early interactions between indigenous peoples, Europeans and Africans...
	6	3. Geography	3. Human Systems  4. Human/Env't Interaction	6. Geographic factors influence the distribution, functions, growth and patterns of cities and other human settlements.  10. The meaning, use, distribution and importance of resources changes over time.	1. Locate, identify and describe major physical features in Minnesota; explain how physical features and the location of resources affect settlement patterns and growth of cities in MN. 1. Describe how land was used during different time periods in Minnesota history; explain how and why land use has changed...

	6	4. History	4. United States History	16. Rivalries among European nations and their search for new opportunities fueled expanding global trade networks... and settlement and exploitation of indigenous peoples and lands...	1. Describe European exploration, competition and trade in the Upper Mississippi River region; describe interactions between Minnesota's indigenous peoples and Europeans in the 17 <sup>th</sup> & 18 <sup>th</sup> centuries. (Example: fur trade)
<b>Surf the Mississippi</b>	4	<b>Social Studies</b> 3. Geography	1. Geospatial Skills  2. Places and Regions  3. Human Systems	2. Geographic inquiry is a process in which people ask geographic question and gather, organize and analyze information to solve problems and plan for the future.  3. Places have physical characteristics (such as climate, topography, vegetation) and human characteristics...	1. Choose the most important data from maps and graphs to answer specific questions about geographic issues...
	6	3. Geography	3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.	1. Locate and identify the physical and human characteristics of places in the United States... (Examples: Mississippi River, settlement patterns) 1. Explain how geographic factors affect population distribution and the growth of cities in the United States.
	5	<b>Science</b> 3. Earth Science	1. Earth Structure and Processes	6. Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.  2. The surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	1. Locate, identify and describe major physical features in Minnesota; explain how physical features and the location of resources affect settlement patterns and growth of cities in MN.  2. Explain how slow processes, such as water erosion... form features of the Earth's surface.
<b>The River Is a Poem</b>	5	<b>Language Arts</b> 2. Writing	A. Types of Writing	The student will compose various pieces of writing.	1. The student will write in a variety of modes to express meaning, including: ...e. poetry.
<b>Big River Art Contest</b>	K-3	<b>Arts</b> 2. Artistic Process	5. Visual Arts	1. Create or make in a variety of contexts in the arts area using the artistic foundations.	1. Create original two- and three- dimensional artworks to express ideas, experiences or stories. 2. Revise an artwork...
	4-5	1. Artistic Foundations	5. Visual Arts	1. Demonstrate knowledge of the foundations of the arts area.  3. Demonstrate understanding of the personal, social, cultural and historical contexts that influence the arts areas.	1. Describe the characteristics of the elements of visual art including color, line, shape, value, form, texture and space. 2. Describe how the principles of visual art such as repetition, pattern, emphasis, contrast and balance are used in the creation, presentation or response to visual artworks.  1. Describe the personal, social, cultural, or historical contexts that influence the creation of visual artworks. 2. Describe how visual art communicates meaning.
		2. Artistic Process: Create or Make	5. Visual Arts	1. Create or make in a variety of contexts in the arts area using the artistic foundations.	1. Create original two- and-three-dimensional artworks to express specific artistic ideas. 2. Revise artworks based on the feedback of others and self-reflection.



<b>Service Learning: Storm Drain Stenciling</b>	3-4	<b>Social Studies</b> 1. Citizenship and Government	1. Civic Skills	1. Democratic government depends on informed and engaged citizens who exhibit civic skills and values, ...apply inquiry and analysis skills and take action to solve problems.	1. Identify ways people make a difference in the civic life of their communities, state, nation, or world by working as individuals or groups to address a specific problem or need.
	5	1. Citizenship and Government	1. Civic Skills	1. (same as above)	2. Identify a public problem in the school or community, analyze the issue from multiple perspectives, and create an action plan to address it.
	4	<b>Science</b> 1. Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers design, create and develop structures, processes and systems that are intended to improve society and may make humans more productive. 2. Engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.	1. Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used. 2. Generate ideas and possible constraints for solving a problem through engineering design.
	5	3. Earth Science	2. Interdependence Within the Earth System	3. Water circulates through the earth's crust, oceans and atmosphere in what is known as the water cycle.	1. Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system...
		3. Earth Science  4. Life Science	4. Human Interactions with Earth Systems  2. Interdependence Among Living Systems 4. Human Interactions with Living Systems	1. In order to maintain and improve their existence, humans interact with and influence Earth systems.  1. Natural systems have many parts that interact to maintain the living system.  1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	1. Compare the impact of individual decisions on natural systems.  1. Explain what would happen to a system such as a wetland... if one of its parts were changed. (Example: Investigate how road salt runoff affects plants, insects and other parts of an ecosystem.)  1. Give examples of beneficial and harmful human interaction with natural systems. (Example: pollution.)
<b>Waters to the Sea (CD-ROM)</b>	4	<b>Social Studies</b> 3. Geography	2. Places and Regions	3. Places have physical characteristics (such as climate, topography, vegetation) and human characteristics (such as culture, population, political and economic systems).	1. Locate and identify the physical and human characteristics of places in the United States. (Examples: Mississippi River, vegetation, weather, climate...; cities, settlement patterns...)
	6	3. Geography	4. Human Environment Interaction	9. The environment influences human actions; humans adapt to and change the environment.	1. Explain how humans adapt to and/or modify the physical environment and how they are in turn affected by these adaptations and modifications.
			3. Human Systems  4. Human Environment Interaction	6. Geographic factors influence the distribution, functions, growth and patterns of cities and other human settlements.  10. The meaning, use, distribution and importance of resources changes over time.	1. Locate, identify and describe major physical features in Minnesota; explain how physical features and the location of resources affect settlement patterns in different parts of MN. 1. Describe how land was used during different time periods in Minnesota history; explain how and why land use has changed over time.

<b>Waters to the Sea (CD-ROM) (cont'd)</b>	4	<b>Science</b> 3. Earth Science	2. Interdependence within the Earth System 4. Human Interactions with Earth Systems	3. Water circulates through the Earth's crust, oceans and atmosphere in what is known as the water cycle.  1. Students will understand that in order to improve their existence, humans interact with and influence Earth Systems.	1. Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system...  1. Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.
	5	3. Earth Science	4. Human Interactions with Earth Systems	1. Students will understand that in order to improve their existence, humans interact with and influence Earth Systems.	1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.
		4. Life Science	2. Interdependence Among Living Systems.  4. Human Interactions with Living Systems	1. Students will understand that natural systems have many components that interact to maintain the living system.  1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	1. Describe a natural system in Minnesota, such as a wetland, prairie or garden, in terms of the relationships among its living and nonliving parts, as well as inputs and outputs. 2. Explain what would happen to a system such as a wetland, prairie, or garden if one of its parts were changed.  1. Give examples of beneficial and harmful human interaction with natural systems. (Example: pollution)
<b>Big River Journey Learning Stations (field trip activities)</b>	<b>Grade Level</b>	<b>Strand</b>	<b>Sub-Strand</b>	<b>Standard</b>	<b>Benchmarks (ex.)</b>
<b>1: Aquatic Invertebrates</b>	3	<b>Science</b> 1. Nature of Science and Engineering	1. The Practice of Science 3. Interactions Among Science, Engineering ...and Society	2. Scientific inquiry is a set of interrelated processes that are used to pose questions about the natural world ... 4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	4. Construct reasonable explanations based on evidence collected from observations or experiments. 1. Use tools, including rulers, magnifiers... to improve observations and keep a record of the observations made.
		4. Life Science	1. Structure and Function in Living Systems.	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	2. Identify common groups of plants and animals using observable physical characteristics, structures and behaviors.
	5	1. Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	1. Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question.

<b>1: Aquatic Invertebrates (cont'd)</b>	5	<p>1. Nature of Science and Engineering</p> <p>4. Life Science</p>	<p>3. Interactions Among Science, Engineering, ...and Society</p> <p>1. Structure and Function in Living Systems.</p> <p>2. Interdependence Among Living Systems.</p> <p>4. Human Interactions with Living Systems</p>	<p>4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.</p> <p>1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.</p> <p>1. Natural systems have many parts that interact to maintain the living system.</p> <p>1. Students will understand that humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.</p>	<p>1. Use appropriate tools and techniques in gathering, analyzing and interpreting data.</p> <p>1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.</p> <p>2. Explain what would happen to a system such as a wetland ... if one of its parts were changed. (Example: Investigate how runoff affects plants, insects and other parts of an ecosystem.)</p> <p>1. Give examples of beneficial and harmful human interaction with natural systems.</p>
<b>2: Mystery of the Disappearing Waterfall</b>	3	<b>Science</b> 1. Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes that are used to pose questions about the natural world ...	4. Construct reasonable explanations based on evidence collected from observations or experiments.
	4	3. Earth Science	1. Earth Structure and Processes	3. Rocks are Earth materials that may vary in composition.	1. Recognize that rocks may be uniform or made of mixtures of different materials.
	5	1. Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	1. Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question.
		3. Earth Science	1. Earth Structure and Processes	2. The surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	1. Explain how, over time, rocks weather and combine with organic matter to form soil. 2. The student will explain how slow processes, such as water erosion, and rapid processes, such as landslides, and volcanic eruptions, form features of the Earth's surface.
	3	<b>Social Studies</b> 3. Geography	1. Geospatial Skills	1. People use geographic representations to acquire, process and report information within a spatial context.	1. Use maps and concepts of location to describe places in one's community, the state of Minnesota, the United States or the world.
			3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.	1. Identify landforms and patterns in population; explain why human populations are unevenly distributed around the world.
	4	3. Geography	3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.	1. Explain how geographic factors affect population distribution and growth of cities in the United States. (Example: landforms)

	4	3. Geography	4. Human Environment Interaction	9. The environment influences human actions; and humans both adapt to and change the environment.	1. Explain how humans adapt to or modify the physical environment and how they are in turn affected by these adaptations and modifications.
<b>3: Adopt-A-River Crime Lab</b>	3	<b>Science</b> 1. Nature of Science and Engineering	1. The Practice of Science	1. Scientists work as individuals and in groups; emphasizing evidence, open communication and skepticism. 2. Scientific inquiry is a set of interrelated processes that are used to pose questions about the natural world ...	1. Provide evidence to support claims, other than saying “I just know,” and question such reasons when given by others. 4. Construct reasonable explanations based on evidence collected from observations or experiments.
	4	1. Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers design, create and develop structures, processes and systems that are intended to improve society and may make humans more productive.	1. Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.
	4	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to improve their existence, humans interact with and influence Earth Systems.	1. Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.
	5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence, humans interact with and influence Earth systems.	3. Compare the impact of individual decisions on natural systems.
		4. Life Science	4. Human Interactions with Living Systems	1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	1. Give examples of beneficial and harmful human interaction with natural systems.
<b>4: River Birds</b>	3	<b>Science</b> 1. Nature of Science and Engineering	3. Interactions Among Science, Engineering ...and Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	1. Use tools, including rulers, magnifiers... to improve observations and keep a record of the observations made.
		4. Life Science	1. Structure and Function in Living Systems.  3. Evolution in Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.  2. Offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.	1. Compare how the different structures of plants and animals serve various functions of growth, survival, and reproduction. 2. Identify common groups of plants and animals using observable physical characteristics, structures and behaviors.  1. Give examples of likenesses between adults and offspring in plants and animals that can be inherited or acquired. 2. Give examples of differences among individuals that can sometimes give an individual an advantage in survival and reproduction.
	5	1. Nature of Science and Engineering	3. Interactions Among Science, Engineering, ...and Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	1. Use appropriate tools and techniques in gathering, analyzing and interpreting data.

<b>4: River Birds (cont'd)</b>	5	4. Life Science	1. Structure and Function in Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.
<b>5: Ecosystem-Ottersystem</b>	3	<b>Science</b> 1. Nature of Science and Engineering	3. Interactions Among Science, Engineering ...and Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	1. Use tools, including rulers, magnifiers... to improve observations and keep a record of the observations made.
		4. Life Science	1. Structure and Function in Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	2. Identify common groups of plants and animals using observable physical characteristics, structures and behaviors.
	5	1. Nature of Science and Engineering	3. Interactions Among Science, Engineering ...and Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	1. Use appropriate tools and techniques in gathering, analyzing and interpreting data.
		4. Life Science	1. Structure and Function of Living Systems 2. Interdependence Among Living Systems 4. Human Interactions with Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.  1. Natural systems have many parts that interact to maintain the living system.  1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.  2. Explain what would happen to a system such as a wetland... if one of its parts were changed. (Example: Investigate how an invasive species changes an ecosystem.)  1. Give examples of beneficial and harmful human interaction with natural systems.
<b>6: Riverboat Piloting</b>	3	<b>Science</b> 1. Nature of Science and Engineering	3. Interactions Among Science, Engineering ...and Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	1. Use tools, including rulers, magnifiers... to improve observations and keep a record of the observations made.
	4	1. Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers design, create and develop structures, processes and systems that are intended to improve society and may make humans more productive.	1. Describe the positive and negative impacts that the designed world has on the natural world...
	5	1. Nature of Science and Engineering	3. Interactions Among Science, Engineering ...and Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	1. Use appropriate tools and techniques in gathering, analyzing and interpreting data. 2. Create and analyze different kinds of maps of the student's community and of Minnesota.

<b>6: Riverboat Piloting (cont'd)</b>	5	2. Physical Science	2. Motion	1. An object's motion is affected by forces and can be described by the object's speed and the direction it is moving.	2. Identify the force that starts something moving or changes its speed or direction of motion.
	6	2. Physical Science	2. Motion	1. The motion of an object can be described in terms of speed, direction and change of position. 2. Forces have magnitude and direction and affect the motion of objects.	1. Measure and calculate the speed of an object that is traveling in a straight line. 2. Identify the forces acting on an object and describe how the sum of the forces affects the motion of the object.
<b>A: Confluence Archaeology</b>	3	<b>Science</b> 1. Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes used to pose questions about the natural world and investigate phenomena.	4. Construct reasonable explanations based on evidence collected from observations or experiments.
			3. Interactions Among Science, Technology Engineering, Math., and Society	2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	1. Understand that everybody can use evidence to learn about the natural world, identify patterns in nature, and develop tools.
	4	1. Nature of Science and Engineering	3. Interactions Among Science, Engineering, ...and Society	3. The needs of any society influence the technologies that are developed and how they are used.	1. Describe a situation in which one invention led to other inventions.
	3	<b>Social Studies</b> 4. History	1. Historical Thinking Skills	2. Historical inquiry is a process in which multiple sources and different kinds of historical evidence are analyzed to draw conclusions about how and why things happened in the past.	1. Examine historical records, maps and artifacts to answer basic questions about times and events in history, both ancient and more recent.
	4	3. Geography	3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of human settlements.	1. Explain how geographic factors affect population distribution and the growth of cities in the United States.
	5	4. History	4. United States History	15. North America was populated by indigenous nations that had developed a wide range of social structures, political systems, and economic activities, and whose expansive trade networks extended across the continent.	1. Describe complex urban societies that existed in North America before 1500. (Example: Hopewell)
	6	3. Geography	3. Human Systems  4. Human Environment Interaction	6. Geographic factors influence the distribution, functions, growth and patterns of human settlements.  10. The meaning, use, distribution and importance of resources changes over time.	1. Locate, identify and describe major physical features of MN.  1. Describe how land was used during different time periods in Minnesota history.



<b>B: Soldier Hike</b>	3	<b>Social Studies</b> 3. Geography	3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of human settlements.  8. Processes of cooperation and conflict among people influence the division and control of the earth's surface.	1. Identify landforms and patterns in population; explain why human populations are unevenly distributed around the world.  1. Identify physical and human features that act as boundaries or dividers; give examples of why people have used boundaries.
	4	3. Geography	2. Places and Regions  3. Human Systems	3. Places have physical characteristics (such as climate, topography, vegetation) and human characteristics (such as culture, population, political and economic systems).  6. Geographic factors influence the distribution, functions, growth and patterns of human settlements.	1. Locate and identify the physical and human characteristics of places in the United States. (Example: Mississippi River, settlement patterns)  1. Explain how geographic factors affect population distribution and growth of cities in the United States.
	5	4. History	1. Historical Thinking Skills	2. Historical inquiry is a process in which multiple sources and kinds of historical evidence are analyzed to draw conclusions about how and why things happened in the past.	1. Pose questions about a topic in history, examine a variety of sources related to the questions, interpret findings and use evidence to draw conclusions.
	6	3. Geography	3. Human Systems  4. Human Environment Interaction	6. Geographic factors influence the distribution, functions, growth and patterns of human settlements.  10. The meaning, use, distribution and importance of resources changes over time.	1. Locate identify and describe major physical features in Minnesota.  1. Describe how land was used during different time periods in Minnesota history.
		4. History	4. United States History	18. Economic expansion and the conquest of indigenous territory spurred agricultural and industrial growth of the United States...	1. Describe how and why the United States claimed and settled the Upper Mississippi River region in the early nineteenth century; explain the impact of steamboat transportation and settlement on the physical, social and cultural landscapes.
<b>C: Cultural Confluence</b>	3	<b>Social Studies</b> 3. Geography	3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of human settlements.  8. Processes of cooperation and conflict among people influence the division and control of the earth's surface.	1. Identify landforms and patterns in population; explain why human populations are unevenly distributed around the world.  1. Identify physical and human features that act as boundaries or dividers; give examples of why people have used boundaries.
	4	3. Geography	2. Places and Regions  4. Human Environment Interaction	3. Places have physical characteristics (such as climate, topography, vegetation) and human characteristics (such as culture, population, political and economic systems).  9. The environment influences human actions; and humans both adapt to and change the environment.	1. Locate and identify the physical and human characteristics of places in the United States. (Example: Mississippi River, settlement patterns)  1. Explain how humans adapt to and/or modify the physical environment and how they are in turn affected by these adaptations and modifications.
	5	4. History	1. Historical Thinking Skills	2. Historical inquiry is a process in which multiple sources and kinds of historical evidence are analyzed to draw conclusions about how and why things happened in the past.	1. Pose questions about a topic in history, examine a variety of sources related to the questions, interpret findings and use evidence to draw conclusions.

<b>C: Cultural Confluence (cont'd)</b>	5	4. History	4. United States History	15. North America was populated by indigenous nations that had developed a wide range of social structures, political systems, and economic activities, and whose expansive trade networks extended across the continent.	1. Describe complex urban societies that existed in North America before 1500. (Example: Hopewell)
	6	3. Geography	3. Human Systems	6. Geographic factors influence the distribution, functions, growth and patterns of human settlements.	1. Locate identify and describe major physical features in Minnesota.
		4. History	4. Human Environment Interaction 4. United States History	10. The meaning, use, distribution and importance of resources changes over time.  16. Rivalries among European nations and their search for new opportunities fueled expanding global trade networks and in North America, colonization, settlement and exploitation of indigenous peoples and lands.  18. Economic expansion and the conquest of indigenous territory spurred agricultural and industrial growth of the United States...  19. Regional tensions around economic development, territorial expansion and governance resulted in a civil war...	1. Describe how land was used during different time periods in Minnesota history.  1. Describe European exploration and trade in the upper Mississippi River region; describe interactions between Minnesota's indigenous peoples and Europeans in the 17 <sup>th</sup> and 18 <sup>th</sup> centuries. (Example: fur trade)  2. Analyze how and why the United States and the Dakota and Anishinaabe negotiated treaties; describe the consequences of treaties on the Anishinaabe, Dakota and settlers in the upper Mississippi River region.  3. Explain the reasons for the U.S.-Dakota of 1862; compare and contrast the perspectives of settlers and Dakota people before, during and after the war.
<b>D: Floodplain Hike</b>	3	<b>Science</b> 4. Life Science	1. Structure & Function of Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	1. Compare how the different structures of plants and animals serve various functions of growth, survival and reproduction.
	4	3. Earth Science	2. Interdependence Within the Earth System	3. Water circulates through the Earth's crust, oceans and atmosphere in what is known as the water cycle.	1. Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation, precipitation.
	5	3. Earth Science	1. Earth Structure and Processes	1. The surface of the Earth changes, some changes are due to slow processes and some changes are due to rapid processes.	2. Explain how processes, such as water erosion, and rapid processes, such as landslides, and volcanic eruptions, form features of the Earth's surface.
		4. Life Science	1. Structure & Function of Living Systems 2. Interdependence Among Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.  1. Natural systems have many components that interact to maintain the living system.	1. Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.  1. Describe a natural system in Minnesota, such as a wetland, in terms of relationships among its living and nonliving parts, as well as inputs and outputs.  2. Explain what would happen to a system such as a wetland if one of its parts were changed. (Examples: runoff, invasive species)

